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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/026,662	12/27/2001	Jaime Hasson	P-4659-US	6998

27130 7590 09/29/2005

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EXAMINER	
WANG, TED M	
ART UNIT	**PAPER NUMBER**
2634	

DATE MAILED: 09/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO 90C (Rev 10/03)

Office Action Summary	Application No. 10/026,662	Applicant(s) HASSON, JAIME
	Examiner Ted M. Wang	Art Unit 2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 December 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12/27/2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/21/05*.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-4 and 15-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Underbrink et al. (US 6,754,287) in view of Steensgaard-Madsen (US 6,271,782).

- With regard claim 1, Underbrink et al. discloses a portable communication device comprising:

  a sigma-delta N-phase shift keying modulator (Fig.10 element 1000, column 9 lines 11-23, where N =2, 4, ..). It is well known in the art that the Phase Shift Keying (PSK) is a polar method for modulating a carrier signal with a data signal (column 7 lines 41-42). For example, in QPSK (N=4), as shown in Underbrinks' reference, a phase shift of 45.degree., i.e. vector 800, represents bit pair 00, a phase shift of 135.degree., i.e. vector 802, represents bit pair 00, a phase shift of 255.degree., i.e. vector 804, represents bit pair 11, and a phase shift of 315.degree., i.e. vector 806, represents bit pair 01. These pairs of bits are commonly referred to as dibits or symbols. In general, distinct information states of PSK signals are commonly referred to as symbols. A symbol may be larger

than a dibit and may contain several bits of information. In general, the phase signal is represented as a vector rotating in the I/Q plane with the length of the vector representing the amplitude of the signal. Separating a signal into I and Q representation facilitates decomposition of the signal into amplitude and phase components, that may then be used to produce a broadcast signal. For a QPSK as seeing in the Fig.8, the symbols completely covering the complex plan in a non-overlapping manner.

Underbrink et al. discloses all of the subject matter as described in the above paragraph except for specifically teaching the sigma-delta N-phase shift keying modulator having a non-uniform polar quantizer.

However, Steensgaard-Madsen teaches a sigma-delta modulator having a non-uniform polar quantizer (Fig.24 element 228, Fig.27, and column 21 lines 48-67). It is desirable to have a sigma-delta modulator having a non-uniform polar quantizer. The reason for this is that, in general, the dynamic-range performance is generally more important than the peak-signal-to-noise ratio performance. A nonuniform loop quantizer can be used to improve the dynamic-range performance. The loop quantizer's step size should be small in the midrange, such that the quantization-noise performance is good for small input signals. The step size is increased near the boundaries of the resolving range, such that the modulator will remain stable if large input signals should leak through to the loop quantizer. Using this technique, the loop quantizer can be simplified greatly without deteriorating the overall performance noticeably, and/or the modulator's

stability be enhanced (column 21 lines 48-67). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus/method as taught by Steensgaard-Madsen in which having a sigma-delta modulator having a non-uniform polar quantizer, into Underbrinks' Sigma-Delta modulator circuitry so as to improve dynamic-range performance so that the modulator's stability is enhanced.

- With regard claim 2, Underbrink et al. further discloses wherein said N is selected from a group including: 2, 4, 8, 16, and 32 (column 7 line 41 – column 8 line 8).
- With regard claim 3, as described in the above paragraph, the modified Underbrink et al. Sigma-Delta MPSK modulator having a non-uniform polar quantizer discloses all of the subject matter as described in the above paragraph except for specifically teaching the detailed devices inside the Sigma-Delta MPSK modulator such as

  a) an adder able to subtract said quantized output signal from said baseband input signal to produce a difference signal;

  b) an integrator able to integrate said difference signal to produce an integrated signal.

  However, Steensgaard-Madsen further teaches

  a) an adder able to subtract said quantized output signal from said baseband input signal to produce a difference signal (Fig.2 element 44 and Fig.24 element 228);

b) an integrator able to integrate said difference signal to produce an integrated signal (Fig.2 element 40 and Fig.24 element $H_C(s)$, where $H_C(s)$ is a loop filter or an integrator).

It is desirable to have a) an adder able to subtract said quantized output signal from said baseband input signal to produce a difference signal; and b) an integrator able to integrate said difference signal to produce an integrated signal. The reason for this is an analog adder/subtractor calculates the difference e(k) of the input signal g(k) and the analog feedback signal a(k). A linear loop filter (integrator) selectively passes e(k) in the signal band. The passed error signal v(k) is fed to the non-uniform quantizer generating d(k), whereby the loop is closed. With this operation, it improves dynamic-range performance so that the modulator's stability is enhanced. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus/method as taught by Steensgaard-Madsen in which having a sigma-delta modulator having a non-uniform polar quantizer, into Underbrinks' Sigma-Delta modulator circuitry so as to improve dynamic-range performance so that the modulator's stability is enhanced.

- With regard claim 4, which is a device claim related to claims 2 and 3, all limitation is contained in claims 2 and 3. The explanation of all the limitation is already addressed in the above paragraph.

- With regard claim 15, which is a method claim related to claim 3, all limitation is contained in claim 3. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 16, the modified Sigma-delta Modulator by Underbrink et al. and Steensgaard-Madsen disclose all of the subject matter as described in the above paragraph except for specifically teaching converting said quantized output signal from digital to analog prior to subtracting said quantized output signal from said baseband input signal.

  However, Steensgaard-Madsen further teaches converting said quantized output signal from digital to analog prior to subtracting said quantized output signal from said baseband input signal (Fig.2 element 42, Fig.24 element 230).

  It is desirable that convert said quantized output signal from digital to analog prior to subtracting said quantized output signal from said baseband input signal. The reason for this is an analog adder/subtractor calculates the difference e(k) of the input signal g(k) and the analog feedback signal a(k). A linear loop filter (integrator) selectively passes e(k) in the signal band. The passed error signal v(k) is fed to the non-uniform quantizer generating d(k), whereby the loop is closed. With this operation, it improves dynamic-range performance so that the modulator's stability is enhanced. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the method as taught by Steensgaard-Madsen in which converting said quantized output signal from digital to analog prior to subtracting said quantized output signal from said

baseband input signal, into Underbrinks' Sigma-Delta modulator circuitry so as to improve dynamic-range performance so that the modulator's stability is enhanced.

- With regard claim 17, which is a method claim related to claim 4, all limitation is contained in claim 4. The explanation of all the limitation is already addressed in the above paragraph.

3. Claims 5, 9, 10, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Underbrink et al. (US 6,754,287) and Steensgaard-Madsen (US 6,271,782) as applied to claim 1 above, and further in view of Dent et al. (US 6,181,920).

- With regard claim 5, Underbrink et al. further discloses an antenna (Fig.2 element 211).

  Underbrink et al. and Steensgaard-Madsen discloses all of the subject matter as described in the above paragraph except for specifically teaching the antenna is a dipole antenna.

  However, Dent et al. teaches a dipole antenna (column 4 lines 3-12).

  It is desirable to have a dipole antenna in the transmitter. The reason for this is that the dipole antenna is simply a two-wire transmission line so the size of the antenna could be very small, and the size reduction will allow the antenna to be hidden in the radio package for many applications so that the cost reduction can be achieved. Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus/method as

taught by Dent et al. in which having a dipole antenna in the transmitter, into Underbrink et al. and Steensgaard-Madsens' transmitter in order to reduce the size of the antenna so that the transmitter cost can be reduced.

- With regard claim 9, which is a device claim related to claims 2 and 5, all limitation is contained in claims 2 and 5. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 10, which is a mobile phone claim related to claim 5, all limitation is contained in claim 5. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 14, which is a mobile phone claim related to claims 9 and 10, all limitation is contained in claims 9 and 10. The explanation of all the limitation is already addressed in the above paragraph.

4. Claims 6, 7, 11, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Underbrink et al. (US 6,754,287) and Steensgaard-Madsen (US 6,271,782) and Dent et al. (US 6,181,920) as applied to claim 5 above, and further in view of McCune (US 6,636,112).

- With regard claims 6 and 7, Underbrink et al. further discloses a Power Amplifier (Fig.2 element 209).

  Underbrink et al. and Steensgaard-Madsen and Dent et al. disclose all of the subject matter as described in the above paragraph except for specifically teaching the power amplifier is a switching power amplifier/Class-E amplifier.

However, McCune teaches a switching power amplifier/Class-E amplifier (column 2 lines 8-36) in order to reduce the power amplifier switching loss so that the power amplifier power efficient is improved.

Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus as taught by McCune in which having a switching power amplifier/Class-E amplifier, into Underbrink et al. and Steensgaard-Madsen and Dents' modified transmitter so as to reduce the power amplifier switching loss so that the power amplifier power efficient is improved.

- With regard claim 11, which is a mobile phone claim related to claim 6, all limitation is contained in claim 6. The explanation of all the limitation is already addressed in the above paragraph.
- With regard claim 12, which is a mobile phone claim related to claim 7, all limitation is contained in claim 7. The explanation of all the limitation is already addressed in the above paragraph.

5. Claims 8, 13, 18, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Underbrink et al. (US 6,754,287) and Steensgaard-Madsen (US 6,271,782) and Dent et al. (US 6,181,920) and McCune (US 6,636,112) as applied to claim 6 above, and further in view of Oursler (US 4,063,199).

- With regard claim 8, Underbrink et al. and Steensgaard-Madsen and Dent et al. and McCune disclose all of the subject matter as described in the above

paragraph except for specifically teaching a bandpass filter coupled to output of said switching amplifier and coupled to said dipole antenna.

However, Oursler teaches that a bandpass filter coupled to output of said switching amplifier and coupled to an antenna (Fig.1 element 30 and column 4 line 51 – column 5 line 8).

It is desirable to have a bandpass filter coupled to output of said switching amplifier and coupled to a antenna. The reason for this is that network 30 provides the proper bandpass filter of the rectangular waveform so as to remove the unwanted modulation products and the undesirable higher frequency harmonics of the carrier frequency so that the transmission signal quality is improved (column 4 line 64 – column 5 line 8). Therefore, It would have been obvious to one of ordinary skill in the art at the time of the invention was made to include the apparatus/method as taught by Oursler in which having a bandpass filter coupled to output of said switching amplifier and coupled to said dipole antenna, into Underbrink et al. and Steensgaard-Madsen and Dent et al. and McCunes' modified transmitter system so as to remove the unwanted modulation products and the undesirable higher frequency harmonics of the carrier frequency so that the transmission signal quality is improved.

- With regard claim 13, which is a mobile phone claim related to claim 8, all limitation is contained in claim 8. The explanation of all the limitation is already addressed in the above paragraph.

- With regard claim 18, Underbrink et al. further discloses using said quantized output signal to select one of N carrier signals each having a frequency and a different one of N phases, thus producing a constant envelope signal at said frequency having variable phase (Fig.10 and column 9 line 11 – column 10 line 4).
- With regard claim 19, Underbrink et al. discloses a portable communication device with a Sigma-Delta modulator (Fig.9 element 902 and Fig.10 1002) connected to a power amplifier input (fig.9 element 904) and then amplifying and transmitting via antenna (Fig.9 element 908). It is inherent that the output signal from Sigma-Delta modulator is a radio frequency (RF) signal.

Conclusion

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ted M. Wang whose telephone number is 571-272-3053. The examiner can normally be reached on M-F, 7:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Ted M Wang
Examiner
Art Unit 2634

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